

# Quantum Field Theory for Philosophers

(Shortened version of January)

## Introduction

- 1) QFT as a guide to metaphysics
- 2) Classical concept of Field  
Field v. Particle theory slide ①
- 3) What do we mean by an individual? - TI
- 4) Field Approach to classical Particle Physics slide ②

## 10 min 5.) Quantum Field Theory

Two approaches:

Field Quantization slide ③ ③ ③ ③ ③  
Second quantization slide ④  
Fock space slide 5, 5a

creation/annihilation operators

Ex: 'real' field  $\rightarrow$  first quantizer  $\rightarrow$  quantum field  
represented S.E.  $\rightarrow$  2nd quantizer slide ⑦

- 20 min 6.) QFTs are divided in 2 cases (slide ⑧)  
Answers:
  - 1) Real field v. Complex field
  - 2) Boson - Fermion field  
v. Fermion - Particle field
  - 3) matter fields (non-fermionic) v. wave fields
  - 4) Weyl's proposal
  - 5.) Causality Condition slide ⑨  
 $\hookrightarrow$  Spin-statistics Theorem. ⑨ ⑨
- But parafield slide ⑩

\* A complete harmonic relation to wave  
and light-quantum descriptions of  
the interaction [between atoms and  
electromagnetic waves]

2.) Centres & unheleties operator in General relativity

Kalam - Muthukrishnan

slide (11)

3.) None - particle Density No. does not conserve  
except  $4f_1, 11$  &  $Q(x)$ .

Done Due P.

4.) Point and Free fields slide (12)

of bootstrap programme: says there, CFTS  
supergravity, renormalizability of field 'matter'

10) What do we mean by renormalization?  
E/H. v. says there renormalization

11) The Problem of individuality  
elem. particles do not possess TI  $\rightarrow$  renormalized

Stat. Relaxed argument. slides (13), (14)

Uniqueness or consistency of states of TI is assured.

12) Substitutionality Principle slide (15)

Postulate on observed  $\rightarrow$  parafields  
" " " states  $\rightarrow$  Boers/Hemmer only

Connection between parafields, parafields  
Space - temporal continuity of trajectory or individual

Vacuum, virtual particles

13) Vacuum  $\lambda = 0$ , fluctuations in  $\Phi(2)$  also

or plaus. limit shift etc - Casimir effect  
of extended particle interpretation.

14) Virtual particles Enfield (11) - (12) +

$1b + 1b'$  solved in terms of its solutions

slide (16)

virtual particle

slide (17)